

**PHASE MATCHED PARAMETRIC LIGHT GENERATION  
IN MONOLITHICALLY INTEGRATED  
INTERSUBBAND OPTICAL DEVICES**

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**ABSTRACT OF THE DISCLOSURE**

An optical device comprises a cavity resonator and an intracavity ridge waveguide.

- 10 The ridge waveguide includes a monolithically integrated intersubband core region and a nonlinear mixing region (NMR). In response to external pumping energy the core region generates laser light at a first frequency and in a first transverse mode. In response to the laser light the NMR generates parametric light at a second frequency and in a second transverse mode. For phase matching the effective-refractive-index-versus-ridge-width characteristics of
- 15 the modes of the laser and the parametric light intersect one another at a phase matching width and so that, at greater widths, the effective refractive index of the mode of the higher frequency light is less than that of the lower frequency light. For true phase matching the width of the ridge is made to be essentially equal to the phase matching width.